Rationalising the Denominator

SCAN ME

REVISE THIS TOPIC

For the entire booklet

1 Show that $\frac{10}{\sqrt{5}}$ can be written in the form $a\sqrt{b}$ where a and b are integers. **[2 marks]**

$\frac{10}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{10\sqrt{5}}{5}$

$= 2\sqrt{5}$

2 Show that $\frac{18}{\sqrt{6}}$ can be written in the form $a\sqrt{b}$ where a and b are integers. **[2 marks]**

$\frac{18}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{18\sqrt{6}}{6}$

$= 3\sqrt{6}$

3 Show that $\frac{70}{\sqrt{2}}$ can be written in the form $a\sqrt{b}$ where a and b are integers. **[2 marks]**

$\frac{70}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{70\sqrt{2}}{2}$

$= 35\sqrt{2}$

4 Show that $\frac{20}{\sqrt{10}}$ can be written in the form $a\sqrt{b}$ where a and b are integers. **[2 marks]**

$\frac{20}{\sqrt{10}} \times \frac{\sqrt{10}}{\sqrt{10}} = \frac{20\sqrt{10}}{10}$

$= 2\sqrt{10}$

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5 Show that $\frac{24}{\sqrt{15}}$ can be written in the form $\frac{a\sqrt{15}}{b}$ where a and b are integers.

[2 marks]

$\frac{24}{\sqrt{15}} \times \frac{\sqrt{15}}{\sqrt{15}} = \frac{24\sqrt{15}}{15}$

$= \frac{8\sqrt{15}}{5}$

6 Show that $\frac{35}{4\sqrt{5}}$ can be written in the form $\frac{a\sqrt{5}}{b}$ where a and b are integers.

[2 marks]

$\frac{35}{4\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{35\sqrt{5}}{20}$

$= \frac{7\sqrt{5}}{4}$

7 Show that $\frac{1}{9\sqrt{2}}$ can be written in the form $\frac{\sqrt{2}}{a}$ where a and b are integers.

[2 marks]

$\frac{1}{9\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{18}$

8 Show that $\frac{60}{\sqrt{24}}$ can be written in the form $a\sqrt{b}$ where a and b are integers

[2 marks]

$\sqrt{24} = \sqrt{4} \times \sqrt{6}$

$= 2\sqrt{6}$

$\frac{60}{2\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{60\sqrt{6}}{12}$

$= 5\sqrt{6}$

9 Show that $\frac{24}{\sqrt{45}}$ can be written in the form $\frac{a\sqrt{5}}{b}$ where a and b are integers.

[2 marks]

$\sqrt{45} = \sqrt{9} \times \sqrt{5}$

$= 3\sqrt{5}$

$\frac{24}{3\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{24\sqrt{5}}{15}$

$= \frac{8\sqrt{5}}{5}$

10 Show that $\frac{10-\sqrt{32}}{\sqrt{2}}$ can be written in the form $a\sqrt{2}-b$

where a and b are integers.

[3 marks]

$\frac{10-\sqrt{32}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}(10-\sqrt{32})}{2}$

$= \frac{10\sqrt{2}-\sqrt{64}}{2}$

$= \frac{10\sqrt{2}-8}{2} \quad = 5\sqrt{2}-4$

11 Show that $\frac{\sqrt{12}+9}{\sqrt{3}}$ can be written in the form $a+b\sqrt{3}$

where a and b are integers.

[3 marks]

$\frac{\sqrt{12}+9}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}(\sqrt{12}+9)}{3}$

$= \frac{\sqrt{36}+9\sqrt{3}}{3}$

$= \frac{6+9\sqrt{3}}{3} \quad = 2+3\sqrt{3}$

12 Show that $\frac{\sqrt{180}+40}{\sqrt{20}}$ can be written in the form $a+b\sqrt{5}$

where a and b are integers.

[3 marks]

$\sqrt{180} = \sqrt{36} \times \sqrt{5}$

$= 6\sqrt{5}$

$\sqrt{20} = \sqrt{4} \times \sqrt{5}$

$= 2\sqrt{5}$

$\frac{6\sqrt{5}+40}{2\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{\sqrt{5}(6\sqrt{5}+40)}{10}$

$= \frac{30+40\sqrt{5}}{10}$

$= 3+4\sqrt{5}$

13 Show that $\left(\frac{1}{\sqrt{2}}\right)^5$ can be written in the form $\frac{\sqrt{2}}{a}$ where a is an integer.

[3 marks]

$\frac{1^5}{(\sqrt{2})^5} = \frac{1}{4\sqrt{2}}$ $\quad \frac{1}{4\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{8}$

14 Show that $\frac{24}{\sqrt{6}} + \sqrt{54}$ can be written in the form $k\sqrt{6}$ where k is an integer.

[3 marks]

$\frac{24}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}} = \frac{24\sqrt{6}}{6}$

$= 4\sqrt{6}$

$\sqrt{54} = \sqrt{9} \times \sqrt{6}$

$= 3\sqrt{6}$

$4\sqrt{6} + 3\sqrt{6} = 7\sqrt{6}$

15 Show that $\frac{42}{\sqrt{18}} + \sqrt{200}$ can be written in the form $k\sqrt{2}$ where k is an integer.

[4 marks]

$\sqrt{18} = \sqrt{9} \times \sqrt{2}$

$= 3\sqrt{2}$

$\frac{42}{3\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{42\sqrt{2}}{6}$

$= 7\sqrt{2}$

$\sqrt{200} = \sqrt{100} \times \sqrt{2}$

$= 10\sqrt{2}$

$7\sqrt{2} + 10\sqrt{2} = 17\sqrt{2}$

16 Show that $\frac{21}{\sqrt{3}} + \frac{12}{\sqrt{48}}$ can be written in the form $k\sqrt{3}$ where k is an integer.

[3 marks]

$\frac{21}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{21\sqrt{3}}{3}$

$= 7\sqrt{3}$

$\frac{12}{4\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{12\sqrt{3}}{12}$

$= \sqrt{3}$

$7\sqrt{3} + \sqrt{3} = 8\sqrt{3}$

$\sqrt{48} = \sqrt{16} \times \sqrt{3}$

$= 4\sqrt{3}$

17 Show that $20 \times \sqrt{3\frac{1}{5}}$ can be written in the form $k\sqrt{5}$ where k is an integer.

[4 marks]

$20 \times \sqrt{\frac{16}{5}} = 20 \times \frac{\sqrt{16}}{\sqrt{5}}$

$= 20 \times \frac{4}{\sqrt{5}}$

$= \frac{80}{\sqrt{5}}$

$= \frac{80}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}}$

$= \frac{80\sqrt{5}}{5}$

$= 16\sqrt{5}$

18 Show that $\frac{\sqrt{3}+\sqrt{5}}{\sqrt{2}} - \frac{5}{\sqrt{10}}$ can be written in the form $\frac{\sqrt{6}}{a}$ where a is an integer.

[4 marks]

$\frac{\sqrt{3}+\sqrt{5}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{6}+\sqrt{10}}{2}$

$\frac{5}{\sqrt{10}} \times \frac{\sqrt{10}}{\sqrt{10}} = \frac{5\sqrt{10}}{10}$

$= \frac{\sqrt{10}}{2}$

$\frac{\sqrt{6}+\sqrt{10}}{2} - \frac{\sqrt{10}}{2}$

$= \frac{\sqrt{6}+\sqrt{10}-\sqrt{10}}{2}$

$= \frac{\sqrt{6}}{2}$

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